INFLUENZA: MORE SERIOUS THAN YOU MAY THINK

U.S. INFLUENZA DISEASE BURDEN AND PREVENTION PROFILE

INFLUENZA AS A DISEASE BURDEN

In the 2003-2004 influenza season in the United States, influenza was the leading cause of vaccine-preventable death in children in the United States and continues to place a significant burden on society every year.1,2 To help reduce influenza-related morbidity and mortality, greater efforts are needed to enhance vaccination rates.

Each year, influenza is responsible for up to 60 million infections (estimated attack rates range from 5% to 20%) in the United States,3 resulting in approximately 25 million visits to doctors’ offices and hospital stays.4 It is evident that many individuals who should be immunized are not vaccinated. New vaccination strategies need to be implemented to help improve vaccination rates and help better protect children, their families, and the community from influenza.

INFLUENZA MORBIDITY AND MORTALITY

(Not limited to high-risk children, but also includes healthy children.)

- Influenza continues to be a significant cause of vaccine-preventable death in children5
- During the 2003-2004 influenza season6
  - 153 children died from influenza-related causes
  - 47% of these children were previously healthy
  - 37% of influenza mortality cases occurred in children aged 5 to 17 years

CHILDREN PLAY A SIGNIFICANT ROLE IN TRANSMITTING INFLUENZA

- By spreading the virus to their family members and classmates at day care or school5
- A school-aged child is often the way most flu epidemics are spread5

SCHOOL-AGED CHILDREN ARE THE AGE GROUP MOST LIKELY TO CONTRACT AND SPREAD INFLUENZA6

- The CDC/ACIP recommends that children who are household contacts of high-risk children or adults be vaccinated7
- Children 5 to 14 years of age were approximately 4 times more likely to be infected with influenza than adults8

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### Average Annual Age-specific Influenza Rates

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>0-4</th>
<th>5-9</th>
<th>10-14</th>
<th>15-19</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate (%)</td>
<td>24</td>
<td>41</td>
<td>38</td>
<td>31</td>
<td>9</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

*Derived combined rates for influenza types A (H1N1 and H3N2) and B over the course of 7 outbreaks during the years between 1978 and 1981 in Tecumseh, Michigan.


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### Influenza Mortality in Children: 2003-2004

153 children aged <18 years reportedly died of influenza-related causes*

- 47% of these children were previously healthy
- 37% of influenza mortality cases occurred in children aged 5 to 17 years

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### Vaccine-preventable Disease and Deaths in the United States

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Annual Cases (Year)</th>
<th>Annual Deaths (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>31,000,000*</td>
<td>36,000 per year (*)</td>
</tr>
<tr>
<td>Pneumococcal disease, invasive (bacteremia &amp; meningitis)</td>
<td>40,000 (’02)</td>
<td>5,500 (’02)</td>
</tr>
<tr>
<td>HPV (Cervical cancer)</td>
<td>10,520 (’04)</td>
<td>3,900 (’04)</td>
</tr>
<tr>
<td>Hepatitis-B*</td>
<td>6,741 (’04)</td>
<td>685 (’03)</td>
</tr>
<tr>
<td>Meningococcal disease*</td>
<td>2,500 per year (1970-2004)*</td>
<td>125 (’04)</td>
</tr>
<tr>
<td>Hepatitis-A*</td>
<td>20,000 (’04)</td>
<td>54 (’03)</td>
</tr>
<tr>
<td>Varicella (chicken pox)</td>
<td>20,948 (’03)</td>
<td>18 (’03)</td>
</tr>
<tr>
<td>Pertussis*</td>
<td>25,827 (’04)</td>
<td>11 (’03)</td>
</tr>
</tbody>
</table>

*Stochastic simulation epidemic model of influenza transmission, which translates into an average annual influenza attack rate of ≈11%.
†Estimated annual rate.
**VACCINATION OF SCHOOL-AGED CHILDREN MAY HAVE SIGNIFICANT DIRECT AND INDIRECT BENEFITS**

- Obligatory vaccination during the Japanese school influenza vaccination program provided evidence that mass vaccination of school-aged children may benefit the community at large.
  - Mortality attributable to pneumonia and influenza decreased by 37,000 to 49,000 deaths per year.

**WHY IS INFLUENZA STILL THE LEADING CAUSE OF VIRUS-PREVENTABLE DEATH IN CHILDREN IN THE U.S.?**

**Vaccination Rates Are Still Low**

- 80 million or more influenza vaccine doses may be available in a given season.
- ACIP recommends influenza vaccination for approximately 200 million people.

- 48% of children aged 6 months to 23 months received ≥1 dose of influenza vaccination.

- Reports for fully vaccinated children (2 doses) in this age group indicate significantly lower immunization rates.

**Vaccine mismatch is a potentially serious problem**

- Vaccine mismatch is a result of antigenic drift.
- Antigenic drift is a continuous process of genetic change among flu strains.

**CDC Data Shows Vaccine Mismatch Occurred in 5 of the Last 10 Years**

<table>
<thead>
<tr>
<th>Season</th>
<th>Vaccine Strain</th>
<th>Drifted Strain</th>
<th>Drifted in Mismatched Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>B/Shanghai</td>
<td>B/Victoria</td>
<td>78%</td>
</tr>
<tr>
<td>2004-2005</td>
<td>A/H3N2/Wyoming</td>
<td>A/H3N2/California</td>
<td>76%</td>
</tr>
<tr>
<td>2003-2004</td>
<td>A/H3N2/Panama</td>
<td>A/H3N2/Fujian</td>
<td>89%</td>
</tr>
<tr>
<td>2000-2001</td>
<td>B/Beijing</td>
<td>B/Sichuan</td>
<td>89%</td>
</tr>
<tr>
<td>1997-1998</td>
<td>A/H3N2/Wuhan</td>
<td>A/H3N2/Sydney</td>
<td>81%</td>
</tr>
</tbody>
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**PREPARING FOR THE 2006-2007 INFLUENZA SEASON**

**Children Aged 2 to 5 Years and Their Close Contacts**

During its February meeting, the ACIP expanded the original recommendation for vaccinating children aged 6 to 23 months to also include children aged 24 to 59 months, beginning with the 2006-2007 season. The ACIP also recommends expanding routine vaccination for household contacts and out-of-home caregivers of children aged 24 to 59 months. Approximately 5.3 million children and their 11.4 million healthy close contacts will be covered by the new recommendation.

**SUMMARY**

Each year, influenza continues to cause significant morbidity and mortality across all age groups. In fact, the May 20, 2006 CDC surveillance reports for the 2005-2006 influenza season, which many view as a mild season, showed 35 reported influenza deaths in children.

Recent CDC/ACIP recommendations include children aged 2 to 5 years, and a continued focus on immunizing all children aged 6 to 59 months and their close contacts will likely reduce the disease burden of influenza; however, effective vaccination strategies must be implemented to raise immunization rates in these groups. Future strategies may also include vaccination of children to significantly reduce influenza morbidity and mortality.

**References:**


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**Immunization Outcomes Are Strongly Influenced by Physicians’ Recommendations**

- Immunization outcomes showed that 70% of children were vaccinated if the parents recalled a physician’s recommendation versus only 3% if they did not.
- For both healthy and high-risk children, influenza vaccination rates are strongly influenced by the parents’ recollection of a physician’s recommendation.

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